

# Online training resources to aid therapeutic radiographers in engaging in conversations about physical activity and diet: A mixed methods study

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## ABSTRACT

**Introduction:** This study explored changes in therapeutic radiographers' (TRs) self-reported knowledge and skills to engage in conversations about physical activity and diet with people living with and beyond cancer following completion of publicly available online courses.

**Methods:** Participants were randomly assigned to two of five online courses that aim to support health professionals to engage in conversations about physical activity and diet in the oncology setting. Participants rated their agreement with 18 statements related to the COM-B (capability, opportunity and motivation-behaviour) model components following completion of an online course on healthy diet (n = 16) and physical activity (n = 21). Semi-structured telephone interviews (n = 21) were also conducted. Analysis of the interviews was guided by the Theoretical Domains Framework.

**Results:** Overall, the online courses were acceptable and the TRs in this study self-reported improved COM to deliver advice on physical activity and diet. The inclusion of the evidence and scientific rationale on the benefits of diet and physical activity, and also guidance on how to start conversations with patients were highlighted as important features of the courses. Suggestions for adaptations to the nutrition courses included the need for content that accounts for the side effects cancer patients experience while undergoing treatment. To support the implementation of training and the delivery of advice on these topics, multi-disciplinary working, organisational support and guidance around professional role boundaries were highlighted as important.

**Conclusion:** Current publicly available online courses on physical activity and diet for oncology health professionals can reduce some barriers among TRs to providing advice to those living with and beyond cancer.

**Implications for practice:** Existing online training courses could be used to support TRs to deliver physical activity and dietary advice in practice. Findings show that these courses can be disseminated within radiotherapy departments. The results also highlight a number of important considerations for the implementation of brief health behaviour advice and online training interventions on physical activity and diet within cancer care.

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## Introduction

The incidence of cancer is continually increasing worldwide.<sup>1</sup> However, despite improving survival rates many people living with and beyond cancer report worse health-related quality of life in comparison to the general population.<sup>2</sup> Physical activity can help improve many common side effects of cancer treatments, including fatigue, psychological distress, adverse impact on body composition, in addition to improving physical function and quality of life.<sup>3,4</sup> Being active after a cancer diagnosis is also correlated with improved survival and reduced recurrence.<sup>5</sup> While research into nutrition and cancer survival remains preliminary, evidence is also emerging that after a cancer diagnosis following a healthy diet can improve quality of life, physical function and reduce fatigue among those living with and beyond cancer.<sup>6–9</sup>

In response to this, the UK Independent Cancer Taskforce outlined the need for healthcare professionals to engage people with cancer in conversations about improving their health by addressing risk factors such as physical activity and diet.<sup>10</sup> Indeed, the delivery of health promotion advice is now recognised as a key part of quality cancer survivorship care.<sup>11</sup> Although oncology healthcare professionals have reported a desire to provide health behaviour advice to their patients, this has not always been observed in practice.<sup>12,13</sup> A survey of 583 therapeutic radiographers (TRs) in the UK published by our research group revealed that 89% believed providing health behaviour advice to cancer patients was part of their role.<sup>13</sup> However, this was not matched by provision of advice as only 19% and 25% of TRs reported advising on healthy eating and physical activity routinely with patients respectively.<sup>13</sup> Qualitative interviews with 15 TRs from this study further highlighted that lack of knowledge, confidence and skills were barriers to lifestyle advice provision.<sup>14</sup> This was particularly the case for advice provision on the topics of physical activity and diet, and online training was highlighted as a potential strategy to address this.<sup>13,14</sup>

The distribution of educational materials may bring about professional behaviour change.<sup>15</sup> Online courses for healthcare professionals can be appropriate for continuing professional development, while allowing flexibility to participate during times that are convenient.<sup>16</sup> Currently there are some publicly available online courses in the UK for oncology professionals on delivering physical activity and dietary advice to cancer patients.<sup>17–23</sup> However, it is unknown if TRs are accessing these resources or if they improve TRs' knowledge, skills or behaviours in delivering advice on these topics. Therefore, the aim of this study was to explore if TRs' self-reported knowledge and skills to deliver brief advice on physical activity and healthy diet changed following completion of publicly available online courses. Determinants to undergoing training and delivering advice on these topics in the radiotherapy setting were also explored.

## Methods

### Study design

An explanatory sequential mixed method design was employed, where integration occurred at the design level.<sup>24</sup> After completing each course, participants completed an online survey to assess their self-perceived 'capability, opportunity and motivation' to deliver physical activity and healthy eating advice. A validated survey was not available and therefore this survey was based on a previous study.<sup>25</sup> The survey was based on the COM-B self-evaluation questions<sup>26</sup> and presented 18 statements and asked participants to rate the extent they agreed with each statement (1 = strongly disagree; 5 = strongly agree) (Table 1). Interviews were used to

obtain further insight into the quantitative survey results to provide a greater understanding of how the online courses addressed barriers to delivering brief health behaviour advice.

### Online courses

To our knowledge, no online courses on engaging in healthy diet and physical activity conversations with people living with and beyond cancer have been specifically designed for TRs. To identify available courses, a Google search using key words was carried out (Table 2). Also, a search of healthcare continuous professional development (CPD) and cancer charitable sector websites in the UK was carried out. The same search was repeated in these websites' search function and/or following relevant links using the drop-down menus. Searches conducted in websites dedicated to cancer topics did not use the search term "cancer", as these sites were already specific to cancer information. The searches were conducted between September 2019 and November 2019. The following criteria were considered in deciding on the final suitable courses for this study:

**Content:** designed to improve physical activity and/or healthy eating knowledge and counselling skills to support those living with and beyond cancer. Courses that focused on one type of cancer were not selected.

**Healthcare professional group:** developed for oncology healthcare professionals and not patients.

**Length:** each course had to take less than 1 h to complete as time is a reported barrier among healthcare professionals in undergoing training.<sup>14</sup>

**Cost:** freely available so all healthcare professionals can access them.

**Accessibility:** available online and publicly available to healthcare staff.

Five online training courses were selected.<sup>17,18,20–22</sup> One of these focused on both physical activity and nutrition<sup>18</sup> one on nutrition<sup>22</sup> and three on physical activity advice.<sup>17,20,21</sup> Details of the course characteristics are outlined in Table 3. A web-based randomiser allocated two of the five online training courses to each participant, resulting in six groups. This was to allow comparison of courses and to minimise participant burden. Participants therefore completed the nutrition course<sup>22</sup> or the physical activity and nutrition course<sup>18</sup> and one of the courses on physical activity<sup>17,20,21</sup> (Table 4).

### Recruitment and procedure

Ethical approval for this study was granted by London South Bank University Research Ethics Committee (Ref: ETH1920-0044/1920–0184). We aimed to recruit 30 participants so that five participants would be allocated to one of the course groups (Table 4). From May 2020 to July 2020, using convenience sampling an email was sent to radiotherapy departments in England inviting participation. After contacting 48 departments, the number of participants was reached and recruitment was stopped. The email included an information sheet explaining the research and inviting TRs to email the research team if they wished to take part. Those who responded were subsequently provided with a consent form to sign and return, and guidance in accessing and completing two online courses and an online survey. Participants were asked to complete the courses within one month and complete the survey immediately after completing the training.

All participants were invited to participate in a semi-structured telephone interview using the interview schedule (supplementary material 1) as a guide. The interviews were conducted by NDP, a lecturer in therapeutic radiography at the time of data collection, who had undergone training in conducting interviews. The

**Table 1**  
Survey responses.

Survey statement <sup>a</sup> the training on delivering physical activity advice has ...	Mean (SD)	95% CI	Survey response % <sup>b</sup>				
			1	2	3	4	5
<b>Capability</b>							
Improved my knowledge on the importance of healthy eating for cancer patients	4.0 (0.73)	3.6–4.4	0%	0%	25%	50%	25%
Improved my knowledge of what to say to cancer patients about healthy eating	4.0 (0.73)	3.6–4.4	0%	0%	25%	50%	25%
Given me the skills to have a conversation about healthy eating	3.9 (0.96)	3.4–4.4	0%	12%	13.5%	50%	25%
<b>Opportunity</b>							
Given me the tools and prompts to remember to have a conversation about healthy eating	3.9 (0.9)	3.4–4.3	0%	6%	25%	44%	25%
Helped me understand how to fit the conversation in to the time I have available	3.5 (1.3)	2.8–4.2	6%	19%	19%	31%	25%
Made signposting to healthy eating resources easier	3.9 (1.0)	3.3–4.4	0%	12%	19%	38%	31%
<b>Motivation</b>							
Given me the confidence to have a conversation on healthy eating with patients	4.0 (1.0)	3.3–4.5	0%	20%	0%	47%	33%
Made me feel like I should talk about healthy eating as part of my role	4.0 (0.6)	3.6–4.5	0%	6%	13%	50%	31%
Was appropriate for my role as a therapeutic radiographer	3.9 (0.9)	3.4–4.4	0%	12.5%	12.5%	50%	25%
<b>Survey statement<sup>a</sup></b> The training on delivering physical activity advice has ...	<b>Mean (SD)</b>	<b>95% CI</b>	<b>Survey response %<sup>c</sup></b>				
			<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Capability</b>							
Improved my knowledge on the importance of physical activity for cancer patients	3.9 (1.1)	3.3–4.4	5%	10%	14%	38%	33%
Improved my knowledge of what to say to cancer patients about physical activity	4.0 (1.0)	3.5–4.4	5%	5%	14%	43%	33%
Given me the skills to have a conversation about physical activity	3.8 (1.2)	3.2–4.3	5%	14%	14%	33.5%	33.5%
<b>Opportunity</b>							
Given me the tools and prompts to remember to have a conversation about physical activity	3.6 (1.1)	3.0–4.1	9%	5%	24%	43%	19%
Helped me understand how to fit the conversation in to the time I have available	3.4 (1.0)	2.9–3.9	0%	19%	43%	14%	24%
Made signposting to physical activity resources easier	3.7 (1.0)	3.2–4.2	0%	19%	14%	43%	24%
<b>Motivation</b>							
Given me the confidence to have a conversation on physical activity with patients	3.8 (1.2)	3.2–4.2	5%	14%	9%	43%	29%
Made me feel like I should talk about physical activity as part of my role	3.9 (1.3)	3.3–4.5	9%	5%	14%	29%	43%
Was appropriate for my role as a therapeutic radiographer	3.9 (1.4)	3.2–4.5	14%	5%	9%	24%	48%

<sup>a</sup> Participants responded on a scale of 1 (strongly disagree), 2 (disagree) 3 (neither agree or disagree), 4 (agree) to 5 (strongly agree).<sup>b</sup> The percentage of TRs reporting each level of agreement ( $N = 16$ ).<sup>c</sup> The percentage of TRs reporting each level of agreement ( $N = 21$ ).**Table 2**  
Search and keywords used to identify online courses.

Search			
Keyword	Keyword	Keyword	Keyword
E-learning OR elearning OR MOOC OR massive open online course OR E-training OR etraining OR online OR remote OR digital OR distance OR web based OR open	AND Module OR course OR training OR learning OR workshop OR CPD OR continuous professional development OR education	AND physical activity OR exercise OR brief health advice OR diet OR dietary OR nutrition OR healthy eating OR food OR MECC OR making every contact count OR lifestyle OR behaviour change OR health behaviour OR health promotion	AND Cancer OR Oncology

interviewer had no previous relationship with the study participants. The interviews were audio-recorded, anonymised and then transcribed verbatim by an external company. The transcripts were verified by NDP against each recording to confirm accuracy. The completed consolidated criteria for reporting qualitative research checklist<sup>27</sup> is available ([supplementary material 2](#)).

### Analysis

The survey responses were analysed using descriptive statistics using Stata version 17. The Theoretical Domains Framework (TDF) guided the analysis of the interviews.<sup>28</sup> The TDF is a theoretical framework synthesised from 128 theoretical constructs from 33 theories and was developed to identify influences on health professional behaviour.<sup>28</sup> The interview transcripts were analysed using content analysis following the framework analysis approach<sup>29,30</sup> and followed guidance on applying the TDF to data analysis.<sup>31</sup> Following familiarisation with the data, NDP independently coded the transcripts, then developed the codes into 'belief statements', then subthemes and allocated these with direct participant quotes to one of the 14 theoretical domains of the TDF.<sup>28</sup> A random selection of transcripts ( $n = 3$ ) were independently

coded by LB, a dietitian, who also allocated the 'belief statements', and subthemes to the TDF domains. NDP and LB then met to compare results and agreed on a final sub theme list and TDF domain in an iterative process. This was used as an analytical framework which was then applied to all of the transcripts and the data summarised in a matrix using Microsoft Excel. Themes were generated by reviewing the matrix connecting the data between and within the participants. The belief statements and themes are described in greater detail using the corresponding TDF and COM-B domain ([supplementary material 3](#)).

### Results

Thirty-seven TRs responded and were provided with a consent form to sign and return, and guidance in accessing and completing two online courses. Five participants could not access one of the courses<sup>18</sup> and were therefore provided with instructions on accessing an alternative course.<sup>22</sup> Sixteen participants completed an anonymous survey reporting their COM-B following the course on nutrition (response rate = 43%) and 21 completed a survey following the course on physical activity (response rate = 57%). Twenty-one participants completed a telephone interview

**Table 3**

Course characteristics.

Course developer and title	Description
BMJ Learning <sup>17</sup> The Health Benefits of Physical Activity: Cancer	A 30-min course that covers the importance and effectiveness of physical exercise as a preventer of cancer, as well as being an essential part of its treatment. As well as how to recommend it to patients with cancer. Aims to develop health professionals' understanding of: - How physical activity can help to prevent cancer. - How physical activity is an essential part of treatment for patients with cancer. - How to recommend physical activity in patients with cancer.
Moving Medicine <sup>21</sup> Cancer. The 1-Minute Conversation, The 5-Minute Conversation, The More-Minute Conversation	A website that provides guidance to healthcare professionals on integrating physical activity conversations into routine clinical care with patients with various health conditions. TRs in the study were instructed to complete the guide in having a 1-Minute Conversation, a 5-Minute Conversation, a More-Minute Conversation with adults with cancer.
Macmillan <sup>20</sup> Understanding Physical Activity & Cancer	A video course to enable healthcare professionals to raise awareness of the importance of physical activity and signpost people to further support. Aims to develop health professionals' understanding of: - The importance of physical activity for people living with cancer. - Resources are available to support people to become more active. - How to deliver effective advice on physical activity in less than 2 min.
Macmillan <sup>22</sup> Nutrition for Living with and Beyond Cancer	A short video course that aims to increase health professionals' knowledge and understanding of nutrition as part of the care provided for people living with and beyond cancer following treatment. Topics covered include: - Eat well feel-good fact or fiction quiz. - Nutrition and dietary advice for people living with and beyond cancer. - Core principles of human nutrition.
World Cancer Research Fund <sup>18</sup> Online Cancer Prevention Training	An online course, with topics that include: - WCRF's 10 cancer prevention recommendations and the science behind them. - Behaviour change theories and how to apply them in practice. - Eating well during cancer. - Debunking common cancer myths.

**Table 4**

Course options that participants were allocated to in each group.

Group	Online courses
Course allocation 1	- World Cancer Research Fund Online Cancer Prevention Training <sup>18</sup> - Moving Medicine. Cancer. The 1-Minute Conversation, The 5-Minute Conversation, The More-Minute Conversation <sup>21</sup>
Course allocation 2	- World Cancer Research Fund Online Cancer Prevention Training <sup>18</sup> - Macmillan. Understanding Physical Activity & Cancer <sup>20</sup>
Course allocation 3	- World Cancer Research Fund Online Cancer Prevention Training <sup>18</sup> - BMJ Learning. The Health Benefits of Physical Activity: Cancer <sup>17</sup>
Course allocation 4	- Macmillan. Nutrition for Living with and Beyond Cancer <sup>22</sup> - Moving Medicine. Cancer. The 1-Minute Conversation, The 5-Minute Conversation, The More-Minute Conversation <sup>21</sup>
Course allocation 5	- Macmillan. Nutrition for Living with and Beyond Cancer <sup>22</sup> - Macmillan. Understanding Physical Activity & Cancer <sup>20</sup>
Course allocation 6	- Macmillan. Nutrition for Living with and Beyond Cancer <sup>22</sup> - BMJ Learning. The Health Benefits of Physical Activity: Cancer <sup>17</sup>

(response rate = 57%). The only reported reason for not taking part in the interviews were issues with accessing one of the online courses.<sup>18</sup> One participant reported this, but no other participants provided feedback on reasons for drop out. Interviews lasted approximately 30 min (range: 20–45 min). Data saturation occurred at interview eighteen, as after this no new codes occurred. The characteristics of the TRs who participated in the study are outlined in Table 5.

### Survey

The self-reported changes in capability, opportunity and motivation to deliver physical activity and dietary advice are shown in Table 1. Participants reported improvements in knowledge on the importance of healthy eating for cancer patients (4.0; CI 3.6–4.4), of what to say to cancer patients about healthy eating (4.0; CI 3.6–4.4) and skills to have a conversation about healthy eating (3.9; CI 3.4–4.4).

### Interviews

Five overarching themes and 7 subthemes were identified (Fig. 1). Themes were (1) online courses can develop TRs'

knowledge of why the delivery of advice is important and how to deliver advice. (2) online courses prompt TRs to deliver advice. (3) TRs need to see the relevance of the courses to their role and patients' needs. (4) organisational commitment and leadership are important to implementation and (5) social comparison and modelling are facilitators to the delivery of advice. The themes and sub themes are presented below with supporting quotes and the participant's number, professional grade and job role.

#### *Online courses can develop TRs' knowledge of why the delivery of advice is important and how to deliver advice*

Participants reported feeling more confident in their ability to deliver advice. Participants mentioned after completing the training they felt they had the psychological knowledge and skills to deliver advice. Particularly because the training provided guidance on how to start these conversations with patients who might not be receptive to receiving advice, and also how to deliver advice in the limited time TRs have with patients.

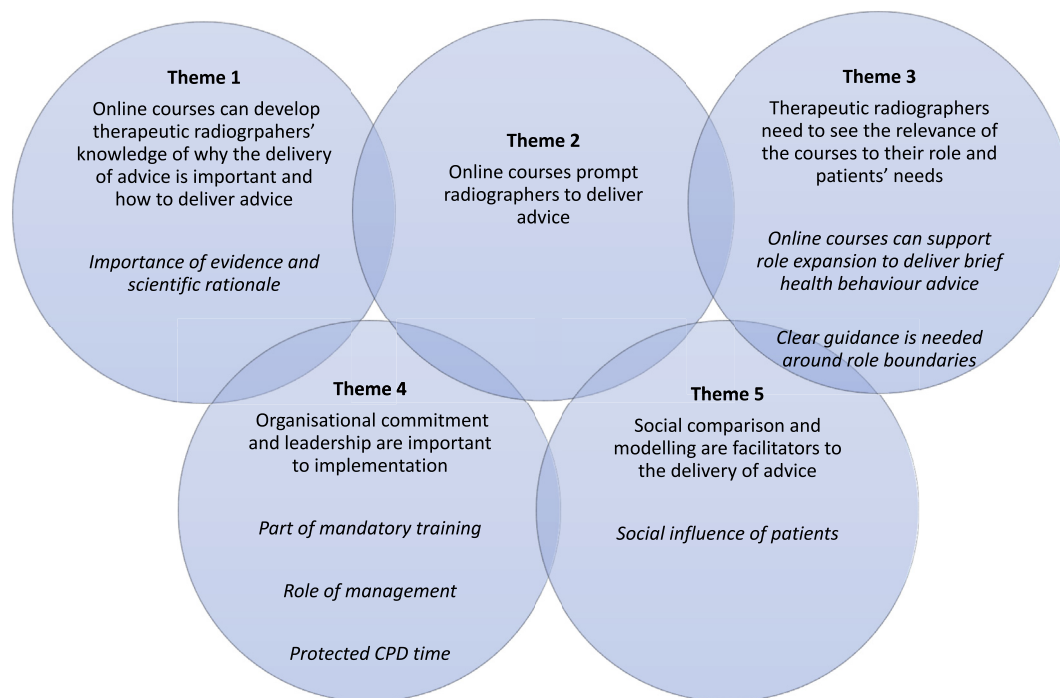
*'I think it's how you start those conversations. When you talk to patients initially some of them are quite defensive, they don't want to have those conversations. What I liked about the way that the online e-learning worked was it encouraged you to think about*

**Table 5**  
Participant characteristics.

Variable	Semi-structured interview	Survey following course on nutrition	Survey following course on physical activity
<b>Number of participants</b>	21	16	21
<b>AfC<sup>a</sup> band</b>			
Band 5	7	4	7
Band 6	8	6	8
Band 7	4	4	3
Band 8	2	2	3
<b>Gender</b>			
Female	21	16	21
Male	0	0	0
<b>Professional Role</b>			
Treatment Radiographer	16	b	b
On Treatment Review Radiographer	4	b	b
Radiotherapy Practice Educator	1	b	b

<sup>a</sup> Agenda for change band. In the UK, the professional grade of TRs is defined by agenda for change band. This ranges from band 5 to band 8 which reflect an individual's professional skills, responsibilities, and job-related knowledge.<sup>32</sup>

<sup>b</sup> Online survey did not collect information on respondents' professional role responsibilities.



**Figure 1.** Representation of themes and subthemes.

how you start those conversations, making it their decision' (**Participant 2\_Band 8 on Treatment Review Radiographer**).

'In reality we don't have the time to go through all this with a patient, so you need the quick points, and what I did like about both of them, especially the nutrition one. I've written it down, there's Top 10 Tips for Eating Well from the British Dietetic Association, and then it breaks them down, you know, each one, but quickly, if you want to read it quickly and remember those points, you can just read the Top 10 Tips, and that kind of prompts you if you want to go into more detail, so I liked that part of it as well' (**Participant 20\_Band 6 Treatment Radiographer**).

One participant mentioned how previously they would not have advised patients on physical activity unless patients were suffering from side effects. However, after completing the training they intend to advise all patients.

'Within our hospital we do have a medical therapies unit that kind of offers exercise information and one-to-one sessions but I don't generally give out the information unless somebody is suffering fatigue but actually now, I'm thinking maybe everybody needs something' (**Participant 21\_Band 8 on Treatment Review Radiographer**).

There were also some immediate changes in practice reported by participants.

'I'm noticing it more when I'm talking to patients. Like I ask them now what kind of exercise are they doing' (**Participant 4\_Band 6 Treatment Radiographer**).

*Importance of evidence and scientific rationale.* Inclusion of the scientific evidence and rationale for physical activity and a healthy



diet for those with cancer was identified as an important feature of the training. Participants mentioned that this gave them the confidence and motivation to have these conversations with patients.

*'I knew that physical activity was important, but when you see the statistics and things like that they brought up, it just reinforced it home that actually yes, this is something that we should be promoting a lot more with our patients' (Participant 4\_Band 6 Treatment Radiographer).*

The benefit of including content on the underlying physiology of how exercise and healthy eating is beneficial was also highlighted. Some participants mentioned that the training could be improved by including additional content on this.

*'I would have liked to have seen more evidence base and the physiological side of it as well rather than just the facts about saying this is not good for you, so what effect does that actually have on the body' (Participant 14\_Band 5 Treatment Radiographer).*

Online courses can prompt radiographers to deliver advice

Participants mentioned how the courses prompted them to develop a habit in delivering advice. The training reminded them to have these conversations with patients, as well as reducing the habit of advising 'rest is best' to manage treatment and cancer related fatigue.

*'It prompted me to mention it. Then once you start mentioning it to a few you kind of get in the habit of doing it, don't you' (Participant 5\_Band 6 Treatment Radiographer).*

*'Patients who are suffering with the tiredness and the fatigue from radiotherapy you don't often think to suggest that actually they do more activity, I think the easy thing to say or the default is to say rest up, listen to your body, take naps and that kind of thing, but actually if they were doing a couple of walks a day or a walk a day it might help in the opposite way and make them feel a bit better' (Participant 11\_Band 6 Treatment Radiographer).*

TRs need to see the relevance of the courses to their role and patients' needs

Overall participants reported that the courses were appropriate to their role, particularly because patients ask TRs for advice on these topics. However, when TRs could make the connection between the content within the courses and their role, they perceived the courses more useful. In particular, more TRs could see how the content within the courses on physical activity were applicable to their role.

*'The physical activity one which was quite practical, that was quite helpful with tips and when I was doing that I felt there was a lot of good advice and I could actually think about how I would be able to introduce what I was learning in that one' (Participant 3\_Band 6 Treatment Radiographer).*

However, some radiographers felt that some of the content within the courses was focused on how to prevent cancer rather than cancer survivorship.

*'Yes, it was definitely 'Do this not to get cancer ... yes, I think it was more how to prevent rather than how to manage' (Participant 5\_Band 6 Treatment Radiographer).*

There was mixed feedback on the usefulness of some of the content within the courses on nutrition. While participants thought the content was a good overview of general healthy eating, TRs would have welcomed more content that was tailored to different cancer diagnoses. If the training on nutrition was more applicable

to the daily role of TRs, some mentioned that radiographers might be more motivated to undergo the training.

*'These modules, even though they're really informative, they're more general, and I think if it was more geared towards, even in modules, for radiographers, I think they would be more motivated and encouraged to use that' (Participant 20\_Band 6 Treatment Radiographer).*

The main suggestions to make the training on nutrition more applicable to TRs were to include more content on appropriate nutrition advice for different cancer diagnoses and treatment sites.

*'It was just general healthy eating; they didn't break down any areas of treatment, but it would be helpful if it was broken down into treatment areas, because we have limitations because of side-effects' (Participant 17\_Band 5 Treatment Radiographer).*

Online courses can support role expansion to deliver brief health behaviour advice. Radiographers reported that after completing the training they could see how they could expand their role in delivering advice on these topics. Some participants mentioned that before completing the training they would have considered the delivery of dietary advice to be solely within the role of dietitians. While TRs acknowledged that dietitians are best placed to give dietary advice, participants mentioned how TRs can fill a gap.

*'(previously) I would have said it probably wasn't part of our role .... a lot of the time our patients will ask us questions around these topics and it is very easy to think the dietitian will be the next port of call' (Participant 3\_Band 6 Treatment Radiographer).*

*'I think it should definitely be in our area because if we didn't get asked it very often then maybe not, but we get asked things like that all the time, and for example our dietitians only come in on a Thursday, so if it's Monday and the patient is asking us questions there's nothing we can really do until Thursday, so we need to know what advice we can give them, so I think it should be in our scope. Obviously, it's a totally different level of understanding to what a dietitian has, but we should have some basic knowledge to at least give some advice' (Participant 12\_Band 5 Treatment Radiographer).*

Clear guidance is needed around role boundaries. Participants mentioned that a barrier in delivering advice is a lack of clear guidance and clarity around professional boundaries. Knowing when the delivery of advice is outside their scope of practice, and who within the multi-disciplinary team they should refer to, is important. Some participants mentioned that this was missing within the training and future training courses should incorporate content on this.

*'I know we have our review team and our dietitians that look after them, so I suppose it's at what point do we give that information, at what point do we refer them to a dietitian when it's their job role and they know lots about it' (Participant 19\_Band 6 Treatment Radiographer).*

Organisational commitment and leadership are important to implementation

Part of mandatory training. Many TRs thought the training was relevant to their role and therefore training on these topics should be mandatory for TRs. It was also noted that if it was mandatory radiographers would have more confidence in the training, and it would facilitate embedding routine delivery of advice within practice. Many TRs suggested introducing topics like this into the

induction training when joining the NHS Trust would be a suitable approach.

*'I think the only way to implement something like this is as part of your mandatory training, as part of induction' (Participant 10\_Band 7 on Treatment Review Radiographer).*

**Role of management.** The importance of managerial support as a facilitator in developing TRs' confidence to both complete the training and provide advice to patients was highlighted.

*'Managerial, I guess if someone doesn't have the confidence and then is worried about doing something wrong that would impact. If you had a supportive management going 'Oh no, do this course and then you'll have the confidence to give the advice, and it is your role and it is your place', that would be quite reassuring' (Participant 1\_Band 5 Treatment Radiographer).*

**Protected CPD time.** Radiographers mentioned that the motivation is there to help patients and to undergo training that is beneficial to their practice. However, a barrier to completing training is time and it was therefore highlighted that having the protected time to undergo this training is key.

*'Obviously time, actually being given CPD time at work, that's always a good one to do. To be fair, I think our department would support it and I think all the radiographers would be really keen to do it'. (Participant 21\_Band 8 on Treatment Review Radiographer).*

**Social comparison and modelling are facilitators to the delivery of advice**

Many mentioned while training is a key facilitator in supporting radiographers to deliver brief health behaviour advice it may not be sufficient on its own. The influence of social comparison and modelling for demonstrating how to deliver advice was highlighted.

*'I learnt it all just in placement from senior staff and other radiographers, what advice they give' (Participant 18\_Band 5 Treatment Radiographer).*

**Social influence of patients.** The inclusion of patients' experiences and preferences for receiving advice was highlighted as an important feature of the courses. Participants mentioned how this enabled them to identify opportunities within their role to deliver advice.

*'I definitely think patient experience is so key. I think it makes it more relatable as well and it definitely gets me thinking which patients in my department would I be having this conversation in and giving me an idea of how the patients feel depending on us having that conversation' (Participant 3\_Band 6 Treatment Radiographer).*

## Discussion

The present study's findings indicate that online courses may support TRs' to engage in conversations around physical activity and diet, increase awareness around the importance of such conversations, and reduce barriers for providing advice. For TRs who already believed such conversations were important and relevant to their role, the training facilitated further improvement in self-perceived knowledge and confidence to deliver advice. The findings also show that participating in online courses on these

topics can prompt radiographers to have brief health behaviour conversations with patients. Participants particularly valued the inclusion of evidence and scientific rationale in the courses. Many mentioned how this was a motivator to deliver advice on physical activity and healthy eating, as well as increasing their confidence to have these conversations. Courses that demonstrated how health professionals could deliver brief health behaviour advice into the short time they have with patients were also valued by participants.

While the findings indicate that online courses can support role expansion among TRs to deliver advice on diet, participants also acknowledged the importance of being supported by a dietitian and being able to access support when advice delivery is outside their professional remit. Additionally, participants highlighted the need for guidance around role boundaries and scope of practice to deliver advice on the topics of diet. This is in line with previous recommendations for a multidisciplinary approach to the delivery of dietary advice, with frontline staff being supported by dietitians.<sup>33,34</sup>

To effectively support TRs to undergo this type of training and to deliver brief health behaviour advice, the importance of organisational and managerial leadership was highlighted, as well as incorporating the training into new staff orientation and as part of mandatory training, in line with previous recommendations.<sup>35</sup> While the delivery of health behaviour advice and the completion of training depends on the capability and willingness of frontline healthcare professionals, managers' commitment is also key to the successful implementation of evidence-based practices and supporting health professionals to transcend professional barriers and roles.<sup>36,37</sup>

The findings also demonstrate that the delivery of training may not be sufficient on its own in supporting TRs to deliver advice on these topics. Implementing new practices and/or changing existing practices in organisations, require changes in both individual and collective behaviour.<sup>31</sup> The interviews from this study showed that while training can improve TRs beliefs about their capabilities to deliver brief health behaviour advice, the delivery of advice is also related to social influences and support. Participants mentioned how clinical practice skills are also learnt from modelling the practices of their colleagues. A review of educational interventions to improve the delivery of nutrition care by doctors also found that while the delivery of nutrition care is influenced by adequate competency, it is also influenced by the social environment, through observing and modelling the behaviours and attitudes of others.<sup>38</sup> Within radiotherapy and oncology, if TRs as a whole are to deliver health behaviour advice, then perceived collective efficacy might positively interact with individual self-efficacy.<sup>39</sup>

The findings from this study add to the evidence that online training may increase health professionals' knowledge and skills to deliver brief health behaviour advice or 'make every contact count'.<sup>25,40–42</sup> While overall the courses were acceptable for TRs, participants mentioned that future courses on nutrition could incorporate more content tailored to different cancer diagnoses and considering the side effects patients experience as a result of cancer and associated treatments. Also, participants felt that some of the content within the courses was focused on how to prevent cancer rather than cancer survivorship. However, previous research has highlighted that TRs primarily deliver advice on health behaviours to patients to help control side effects rather than focusing on cancer survivorship and general health.<sup>13,33</sup> Therefore, a consensus may be needed on the requisite course content for TRs on delivering dietary advice.

Lifestyle choices are made by individuals, but these choices may be facilitated or impeded by HCPs.<sup>43</sup> With a greater focus on supporting patients to self-manage, health professionals are required

to embrace health promotion as a part of their role.<sup>10,43</sup> The findings of this study show that current online courses for oncology health professionals on the topics of physical activity and nutrition may support TRs' in meeting this recommendation. Increasing self-efficacy via online courses may increase practices among TRs to deliver advice, as higher self-efficacy among healthcare professionals is associated with higher levels of health behaviour advice delivery.<sup>44</sup> In the current study some radiographers mentioned they had already implemented some of what they learnt into their practice.

## Limitations

While efforts were made to invite TRs who might be unaware of online courses on these topics or the benefits of physical activity and nutrition for those living with and after cancer, the sample were self-selecting. This may have led to the recruitment of TRs who are already interested in health promotion. The sample size was small and may not represent the views of the wider therapeutic radiography workforce. Additionally, although participants perceived usefulness of the courses were explored through discussion of course features and content, comparison between courses focusing on the same topic were not explored to identify those that are most useful for TRs.

## Conclusion

This study demonstrated that current online courses on physical activity and diet for those with and living beyond cancer are acceptable for TRs and can be easily disseminated within radiotherapy departments. The findings show that for training on these topics to be effective, TRs need to see the relevance to their role, which may encourage TRs to complete training on these topics. Suggestions for adaptations to nutrition courses included the need for content that accounts for the side effects cancer patients experience while undergoing treatment. The use of the TDF in the analysis of the interviews, highlighted the key 'behaviour change' features of the courses that can be applied in future training intervention developments. Such as the inclusion of the evidence and scientific rationale on the benefits of diet and physical activity and also guidance on how to start conversations with patients. The results of this study also highlight a number of important considerations for the implementation of brief health behaviour advice and online training interventions within cancer care. In particular, the importance of multi-disciplinary working, organisational support and clear guidance around professional role boundaries.

## Authors' contributions

NDP was the principal investigator of the study. NDP, AF and RJB conceived the study and obtained the funding with JW, NW and LC. AF, RJB, JW, NW, LC, ASL provided input into the design of the study. NDP conducted the interviews. NDP and LB analysed the data. NDP drafted the manuscript, then circulated among all authors for comments and revision. All authors read and approved the final manuscript.

## Conflict of interest statement

JW was previously a member of staff at Macmillan Cancer Support. No other conflicts of interests are declared.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.radi.2021.09.004>.

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